REMARKS

Claims 1-30 are all the claims presently pending in the application. Claim 30 has been amended to more particularly define the invention. Claim 30 has been withdrawn by the Examiner as allegedly directed to an independent and distinct invention.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Applicant gratefully acknowledges that claims 12 and 24 are allowable. However, Applicant respectfully submits that all of the claims are allowable.

Claims 1-8, 10, 11, 13-23, 25 and 27-29 stand rejected under 35 U.S.C. §102(b) as being allegedly anticipated by Rigoutsos et al. "Building Dictionaries of 1D and 3D Motifs by Mining The Unaligned 1D sequences of 17 Archaeal and Bacterial Genomes" (1999) (hereinafter "Rigoutsos"). Claims 9 and 26 stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Rigoutsos in view of Delcher et al. "Improved Microbial Gene Identification with GLIMMER (1999) (hereinafter "Delcher").

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

The claimed invention (e.g., as recited in claim 1) is directed to a system for identifying genes. The system includes a pattern database comprising patterns of amino acids, and an input device for inputting a genomic DNA sequence.

Importantly, the system further includes a processor which translates an open reading frame (ORF) of the DNA sequence into an amino acid translation, and locates in the amino acid translation occurrences of the patterns from the pattern database to determine whether the open reading frame includes a putative gene in the DNA sequence.

Conventional systems for identifying genes (e.g., putative genes) are either based on the use the statistics of DNA sequences, or the use of similarity searches to determine gene locations (Application at page 2, lines 7-22). However, these conventional methods have various problems which prevent them from efficiently identifying genes in a given DNA sequence (Application at page 3, line 19-page 4, line 21).

The claimed invention, on the other hand, includes a processor which translates an open reading frame (ORF) of the DNA sequence (e.g., **a genomic DNA sequence**) into an amino acid translation, and locates in the amino acid translation occurrences of the patterns from the pattern database to determine whether the open reading frame includes a putative gene in the DNA sequence (e.g., a genomic DNA sequence) (Application at Figure 1; page 5, lines 4-11). The claimed invention may be considered as including the best characteristics of statistical approaches and database similarity searches, in identifying genes in a given DNA sequence (Application at page 6, lines 18-21).

II. THE RESTRICTION REQUIREMENT

Applicant notes that the Examiner has completely ignored and failed to respond to Applicant's reasoned argument for withdrawing the Restriction Requirement of claim 30. The Examiner cannot simply ignore Applicant's argument, but is required to respond to Applicant's argument and, therefore, Applicant reiterates the argument in full and respectfully requests that the Examiner respond to Applicant's argument or withdraw the Restriction Requirement.

The Examiner has withdrawn claim 30 from prosecution alleging only that claim 30 is "independent or distinct" from the invention originally claimed. However, Applicant would point out that the Examiner has clearly failed to support his restriction of claim 30 from prosecution.

First, Applicant respectfully submits that the Examiner cannot just make the vague

assertion that claim 30 is "independent or distinct". Instead, the Examiner must state specifically in the Office Action whether he is alleging that claim 30 is independent of the originally claimed invention, or that claim 30 is distinct from the originally claimed invention, in order to allow Applicant to properly respond to the restriction requirement.

The Examiner must then support his allegation with facts. Here, however, the Examiner merely states that "claim 30 recites limitations which cause said claim to be distinct from the examined invention", which is clearly insufficient under MPEP §802.01.

Indeed, MPEP §802.01 defines the term "independent" (i.e., not dependent) meaning that there is no disclosed relationship between the two or more subjects disclosed, that is, they are unconnected in design, operation, or effect, for example: (1) species under a genus which species are not usable together as disclosed; or (2) process and apparatus incapable of being used in practicing the process.

Further, MPEP §802.01 also defines the term "distinct" as meaning that two or more subjects as disclosed are related, for example, as combination and part (subcombination) thereof, process and apparatus for its practice, process and product made, etc., but are capable of separate manufacture, use, or sale as claimed, AND ARE PATENTABLE (novel and unobvious) OVER EACH OTHER.

Nowhere has the Examiner alleged that the invention of claim 30 and the originally claimed invention are unconnected in design, operation, or effect (e.g., a species under a genus which species are not usable together as disclosed; or a process and apparatus incapable of being used in practicing the process), and thus, he has not alleged that claim 30 is **independent of** the originally claimed invention. Further, nowhere has the Examiner alleged that the invention of claim 30 and the originally claimed invention are related, for example, as combination and part (subcombination) thereof, process and apparatus for its practice, process and product made, etc., but are capable of separate manufacture, use, or sale as claimed, AND ARE PATENTABLE (novel and unobvious) OVER EACH OTHER, and thus, he has not alleged that claim 30 is **distinct from** the originally claimed invention.

Moreover, even assuming (arguendo) that claim 30 is either independent or distinct from the original claimed invention, the Examiner has clearly failed to show that there would be some undue burden if the Examiner examined claim 30 with the other pending claims. Indeed, MPEP 802.01 states that "*a serious burden on the examiner may be prima facie shown if the examiner shows by appropriate explanation of separate classification, or separate status in the art, or a different field of search*". However, nowhere has the Examiner made such an allegation.

Therefore, Applicant submits that the Examiner has clearly failed to support his restriction of claim 30 from prosecution. Therefore, the Examiner is respectfully requested to withdraw this restriction requirement.

III. THE ALLEGED PRIOR ART REFERENCES

The Examiner alleges that Rigoutsos teaches the claimed invention of claims 1-8, 10, 11, 13-23, 25 and 27-29 and would have been combined with Delcher to form the invention of claims 9 and 26. Applicant submits, however, that there are elements of the claimed invention which are neither taught nor suggested by Rigoutsos, and that Rigoutsos would not have been combined with Delcher and even if combined, the combination would not teach or suggest each and every feature of the claimed invention.

Applicant respectfully submits that these references would not have been combined as alleged by the Examiner. Indeed, these references are unrelated, and no person of ordinary skill in the art would have considered combining these disparate references, absent impermissible hindsight.

In fact, these references clearly do not teach or suggest their combination. Therefore, Applicant respectfully submits that one of ordinary skill in the art would not have been so motivated to combine the references as alleged by the Examiner. Therefore, the Examiner has failed to make a prima facie case of obviousness.

Moreover, contrary to the Examiner's allegations, neither Rigoutsos nor Delcher, nor any combination thereof teaches or suggests an input device for inputting a **genomic** DNA sequence,

and *"a processor which: translates an open reading frame (ORF) of said DNA sequence into an amino acid translation; and locates in said amino acid translation occurrences of said patterns from said pattern database to determine whether said open reading frame includes a putative gene in said DNA sequence"*, as recited, for example, in claim 1, and similarly recited in claims 16, 23 and 29.

As noted above, unlike conventional systems for identifying genes (e.g., putative genes) which are either based on the use of the statistics of DNA sequences, or the use of similarity searches to determine gene locations, the claimed invention includes a processor which translates an open reading frame (ORF) of the DNA sequence into an amino acid translation, and locates in the amino acid translation occurrences of the patterns from the pattern database to determine whether the open reading frame includes a putative gene in the DNA sequence (Application at Figure 1; page 5, lines 4-11). The claimed invention may be considered as including the best characteristics of statistical approaches and database similarity searches, in identifying genes in a given DNA sequence (Application at page 6, lines 18-21).

Clearly, these features are not taught or suggested by the Rigoutsos or Delcher. In fact, neither "Rigoutsos" nor "Delcher" have any relevance to the disclosed process.

Specifically, Rigoutsos merely discloses a method of using the Teiresias algorithm to carry out pattern discovery. Delcher merely discloses a gene finding method which uses interpolated Markov Model (IMM). These are completely unrelated to each other and clearly do not teach or suggest the a processor which translates an open reading frame (ORF) of the DNA sequence into an amino acid translation, and locates in the amino acid translation occurrences of the patterns from the pattern database to determine whether the open reading frame includes a putative gene in the DNA sequence.

In Summary, Rigoutsos and Delcher are not relevant to the claimed invention.

First, with respect to Rigoutsos: knowing this 1999 paper does not make the contents of this disclosure obvious. Indeed, it took the inventors almost 3 years after they described the 1999 work to complete a working method for the gene discovery method that we describe in the

disclosure of the present Application.

Second, Delcher does not apply at least because of:

1) Delcher uses nucleotide sequences for training

2) Delcher uses sequences from archaeal and bacterial genomes only for training

3) Delcher builds a Hidden Markov Model (HMM) from carefully-selected sequences

4) Delcher uses the HMM to query nucleic acid sequences and compare the expectation in nucleotide sequence space as captured by the HMM with what is encountered in the input at hand

5) In Delcher the comparison is done in the space of nucleotide sequences

6) In Delcher if its nucleotide sequences matches the expectation in terms of nucleotide sequence composition as the latter is captured by the HMM then an ORF is reported as a putative gene.

On the other hand, the claimed invention is completely different and unrelated to Delcher at least because of:

1) the claimed invention may begin with the biggest possible database of amino acid sequences

2) the claimed invention may use sequences from archaeal, bacterial, eukaryotic and viral genomes

3) the claimed invention may convert the knowledge captured by the collection of amino acid sequences to a different representation, one of patterns p derived through unsupervised pattern discovery on these amino acid sequences

4) the claimed invention may translate a given ORF into a putative amino acid sequence S

5) the claimed invention may examine S to determine whether it contains one or more patterns p from the collection that was discovered above (e.g., in step 3)

6) the claimed invention may use the number of patterns p that have instances in S to decide whether the putative amino acid sequence is well-formed

7) the claimed invention may carry out comparisons in the space of amino acid sequences

8) in the claimed invention, if the putative amino acid sequence is well-formed then the ORF from which it was generated is reported as a putative gene

Therefore, contrary to the Examiner's allegations, neither Rigoutsos nor Delcher nor any alleged combination thereof teaches or suggests an input device for inputting a genomic DNA sequence, and certainly does not teach or suggest a processor which translates an open reading frame (ORF) of the DNA sequence into an amino acid translation, and locates in the amino acid translation occurrences of the patterns from the pattern database to determine whether the open reading frame includes a putative gene in the DNA sequence, as in the claimed invention.

Therefore, Applicant submits that these alleged references would not have been combined and even if combined, the combination would not teach or suggest each and every element of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

IV. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-30, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Assignee's Deposit Account No. 50-0510.

Respectfully Submitted,

Date: 4/4/06

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CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that the foregoing Amendment was filed by facsimile with the United States Patent and Trademark Office, Examiner C. Dune Ly, Group Art Unit # 2168 at fax number 571-272-8300 this 4th day of April, 2006.

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